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(19) Europäisch s Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 531 038 A2**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **92307758.0**

(51) Int. Cl.[5] : **E21B 17/07**

(22) Date of filing : **26.08.92**

(30) Priority : **03.09.91 US 754444**

(43) Date of publication of application :
10.03.93 Bulletin 93/10

(84) Designated Contracting States :
DE FR GB

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(54) Packer for telescopic riser joint.

(57) An improved riser telescopic joint including a riser mandrel (14), an annular resilient packer (58) carried by the riser mandrel, a telescoping mandrel (12) positioned within and movable with respect to the riser mandrel, a line (66) connected to the riser mandrel for delivering fluid under a predetermined pressure against the exterior of the packer to cause it to seal against the telescoping mandrel and a restricted flow passage (84) communicating from the exterior to the interior of the packer to supply a limited amount of the pressure fluid as a lubricant between the interior of the packer and the exterior of the telescoping mandrel.

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The present inv ntion relates to a tel scopic joint used at the top of a riser extending from a subsea wellhead to the surface which allows relative motion between the ris r mandrel and a telescoping tubular mandrel and to a packer positioned between the riser mandrel and the telescoping mandrel. In prior risers tel scopic joints have been used to provide such relative motion. Such telescopic joints have included resili nt packers which include apparatus for the introduction of a fluid under pressure to exert a controlled force on the exterior of the packer to seal against the hydrostatic head of mud. In such prior structures the pressure introduced was controlled to allow a limited leakage of mud past the packers for lubrication purposes.

Recently specifications have been adopted which require telescopic joint packers to be able to seal against pressures up to 200 psi. Additionally, some operators are requesting that the telescopic joint packers have the ability to seal against pressures up to 500 psi. Such high sealing pressures exerted on the resilient packer prevents any lubricating leakage of mud past the packing. This results in high packer wear rates and in some extreme cases may prevent the relative motion between the telescoping mandrel and the riser mandrel.

US-A-2071197, 2746709, 2843349 and 3492007 all disclose blowout preventers for use on a well in which the packer is activated into its sealing position responsive to fluid pressure applied thereto.

US-A-2176355 discloses a drilling head having an annular resilient packer sleeve which is arranged to close around a kelly when it is exposed to external pressure.

US-A-2192805 discloses casing head seals in which pressure is supplied through an annular metal sleeve to the exterior of an annular flexible packer to provide sealing against the string extending therethrough.

US-A-1458270 discloses a flexible seal which is inflated to be a wiper seal against the exterior of a pump rod.

US-A-3471156 discloses an inflatable packing for a stuffing box in which the interior of the packing is provided with a plurality of annular recesses to provide a plurality of lip seals which seal against the rod xtending through the box.

None of this prior art has any appreciation of the problem of providing a high pressure seal without excessive friction and wear as hereinafter explained.

The present invention relates to a telescopic joint which can seal against very high pressures without causing excessive wear or preventing relative motion of the joint. The new telescopic joint includes a riser mandrel, a telescoping mandrel, a resilient annular packer carried by the ris r mandrel and position d to span the annulus betw en the exterior of the telescoping mandrel and th interior of th riser mandrel to s al against such surfaces, means for introducing a fluid under pressure against the xterior f the resilient packer to force it into sealing ngagem nt with the tel scoping mandrel surface, and m ans for allowing a controll d amount of the fluid introduced against the exterior of th resili nt packer to the interior of the packer to provide lubrication between the resilient packer and the exterior surface of the telescoping mandrel.

The invention thus provides a improve telescopic joint for a riser which provide a pressure energized seal against substantial pressures without creating excess friction between the packer and the surface against which it is to seal.

In the accompanying drawings:

FIGURE 1 is an axial sectional view of the top portion of a riser mandrel and telescopic joint of the prior art;

FIGURE 2 is a similar sectional view of the lower portion of the structure shown in FIGURE 1;

FIGURE 3 is a partial detailed sectional view of a packer structure of the present invention which is installed in a telescopic joint such as shown in FIGURES 1 and 2 in place of the packer structure illustrated therein; and,

FIGURE 4 is an elevation view of the environment in which the structure of the present invention is used.

In FIGURES 1 and 2 a telescopic joint 10 of the prior art includes upper telescoping mandrel 12 and the upper end of riser 14 which is in surrounding relationship to mandrel 12. Resilient annular packer 16 is positioned within packer housing 18. Upper ring 20 and lower ring 22 are molded in annular packer 16 as shown with tubular member 24 positioned between the rings. The exterior surface of packer 16 is positioned against the inner surface of tubular member 24. The interior surface 26 of packer 16 is positioned to seal against the exterior surface 28 of the upper end of telescoping mandrel 12. pressure fittings 30 connect into the ports 32 extending through housing 18. Housing 18 is secured at its lower end to riser 14 and at its upper end to flange 34 on tubular member 36. Tubular member 36 includes exterior groove 38. Eccentric locks 40 are supported from flange 42 so that they can be rotated into groove 38 or out of groove 38. Flange 42 is the lower portion of tubular member 44 which supports mandrel 12.

When joint 10 is installed and properly supported with mandrel 12 extending through the upper interior of riser 14, then eccentric locks 40 are rotated out of their locking positions in groove 38 and fluid under pressure is delivered through fittings 30 and ports 32 into th annular chamber 46 surrounding tubular member 24. Such pressure is sufficient to cause annular packer 16 to be urged inwardly into sealing engag ment with xterior surface of mandrel 12.

Trouble is encountered with this prior art struc-

ture when th pressure applied into annular chamber 46 is increas d to l vels not contemplated by the design of such structures. In such cases the xcessiv sealing pressure causes the normal well fluids to b excluded s that there is no lubrication betw en the packer 16 and the xterior of mandrel 12. This can cause excessive wear of the packer material and can be sufficient to prevent relative movement between mandrel 12 and riser 14. Under these conditions the structure of the prior art is not satisfactory.

The improved telescopic joint of the present invention is identical to joint 10 except that an improved packer structure 50 is provided as shown in FIGURE 3. Packer housing 52 is secured to lower flange 54 on the top of tubular housing 53 which is secured to the top portion of the riser (not shown) and to upper flange 56 which is releasably connected to the upper structure supporting the telescoping mandrel (not sh wn). Resilient annular packer 58 includes upper ring 60 and lower ring 62 molded therein. Sleeve 64 is positioned on the exterior surface of packer 58 and between rings 60 and 62. Sleeve 64 has openings extending therethrough to allow pressure from chamber 68 to communicate with the exterior of packer 58. Port 66 extends through housing 52 to conduct fluid under pressure into chamber 68 between the interior of housing 52 and the exterior of sleeve 64. Upper support ring 67 and lower support ring 69 are positioned above and below packer 58 within housing 52 as shown. The inner surface 70 of packer 58 includes upper groove 72, lower groove 74, central groove 76 with upper land 78 and lower land 80 between the grooves as shown. Fitting 82 is threaded into plate 83 which is molded into packer 58 and has a control orifice therein, preferably with suitable filters, and communicates with at least one opening 84 extending through packer 58 into its interior within central gro ve 76.

With the fluid used to pressurize packer 58, a small amount is delivered through fitting 82 into central groove 76 and provides lubrication between the interior of packer 58 and the exterior surface of the telescoping mandrel. With this small amount of lubrication, the problems of packer wear and excessive frictional resistance to the movement of the telescoping mandrel are avoided.

In service the telescopic joint of the present invention is shown in FIGURE 4 in the connection with th equipment extending from a subsea wellhead to a drilling vessel 112. As shown wellhead collet connector 100 is provided on the lower end of the blowout preventer stack 102 for connecting to the wellhead (not shown). Riser system 104 includes the riser collet connector 105 for connecting the upper end of blowout preventer stack 102 to riser stab system 106. Ball j int 108 is positioned between the upper end of riser stab system 106 and th riser system 104. Telescoping joint 110 of the present inventi n having the improved packer structure previously describ d, is connected into riser system 104 at its upper nd as shown.

As previously described, the improved telescoping joint of the present system provides pressure energization of the s al against substantial pressures without creating excess friction between the packer and its sealing surface. This allows freedom of movement of the telescoping joint which is needed without sacrificing the sealing need between its telescoping members.

Claims

1. A riser joint comprising a riser tubular mandrel (14) having an upper end; a telescoping mandrel (21) positioned for axial movement within the upper end of the riser tubular mandrel; a resilient annular packer (58) carried on the interior of the riser mandrel; and means (66,68) for delivering a fluid under substantial pressure against the exterior of the annular packer to cause it to seal against the exterior of the telescoping mandrel; characterised by means (84) for conducting a predetermined small amount of the fluid under pressure to the interior of the packer to provide lubrication for the movement of the telescoping mandrel thereagainst.

2. A riser joint according to claim 1, wherein the delivering means includes an opening (66) through a housing (52) to communicate with the exterior of the annular packer (58).

3. A riser joint according to claim 1 or claim 2, wherein the conducting means includes a restricted passage (84) through the annular packer to allow a small amount of fluid to pass therethrough to provide lubrication for the relative movement of the telescoping mandrel with respect to the annular packer.

4. A riser joint according to claim 1, wherein the annular packer includes at least one internal groove (76) whereby fluid conducted through the packer is discharged into the groove.

5. A packer for sealing between two tubular members (12,14) of a telescopic joint the packer comprising a resilient annular packer (58); means (52) for mounting the annular packer on one of the tubular members to provide sealing against the other of the tubular members; and means (66) for delivering a fluid under pressure to the xterior of the packer; characterised by means (82,84) for conducting a small amount of the fluid under pressure to the interior of the packer to provide lu-

brication for the movem nt of the other member against the annular packer.

6. A pack r according to claim 5, wh rein th conducting means includes a restrict d passage (84) through the annular packer to allow a small amount of fluid to pass therethrough to provide lubrication for the relative movement of the other member with respect to the annular packer.

7. A packer according to claim 5, wherein the annular packer includes at least one internal groove (76), whereby fluid conducted through the packer is discharged into the groove.

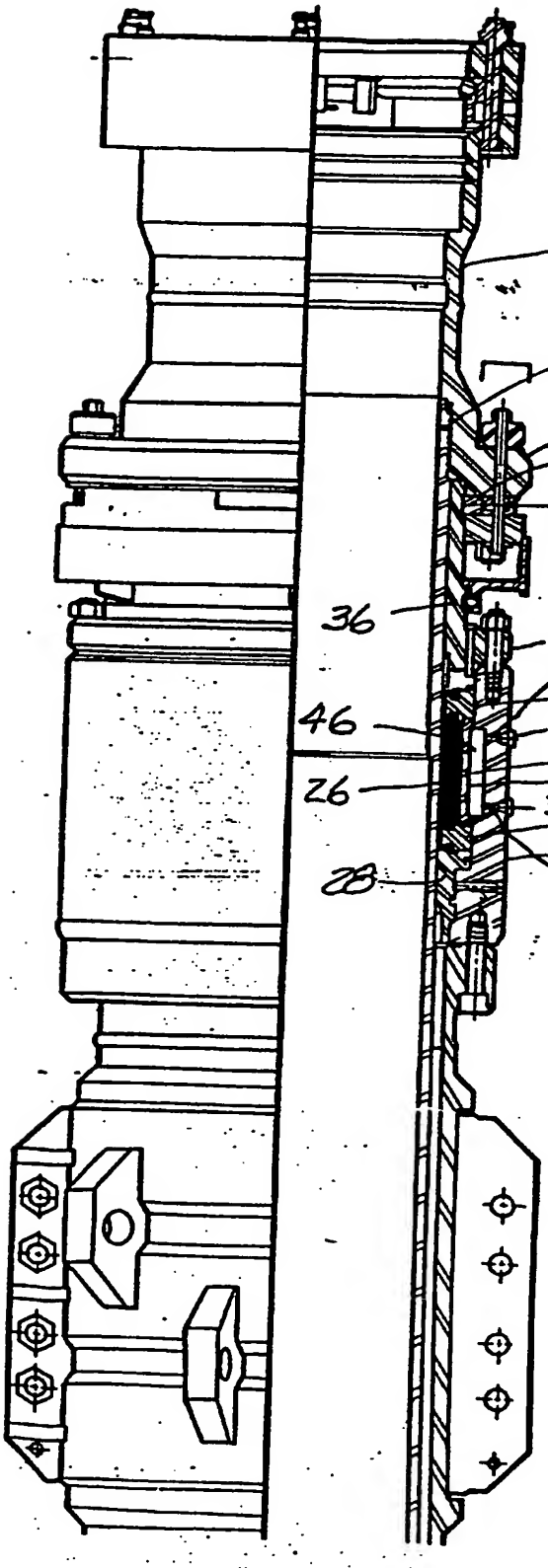


FIG. 1 PRIOR ART

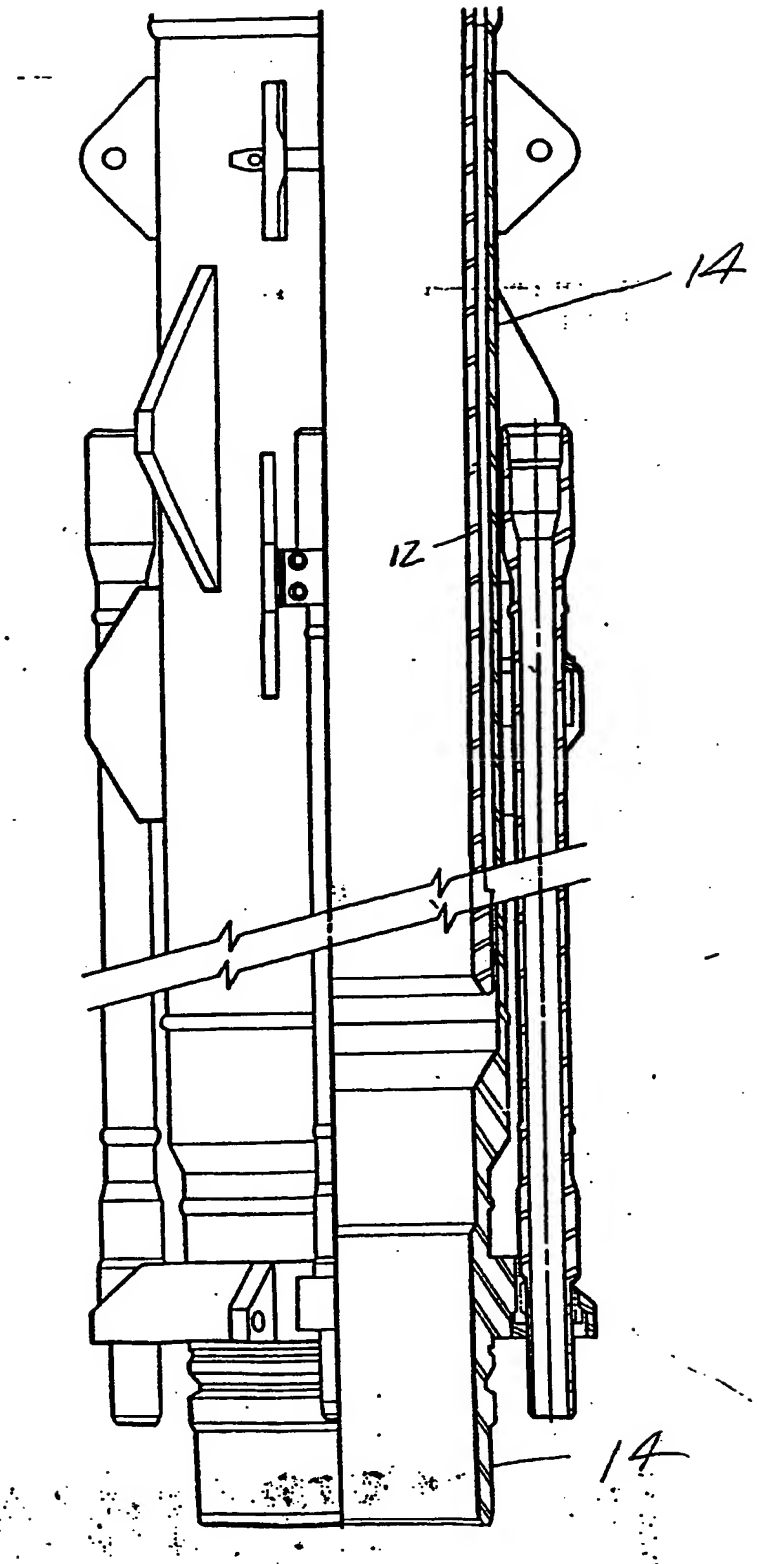
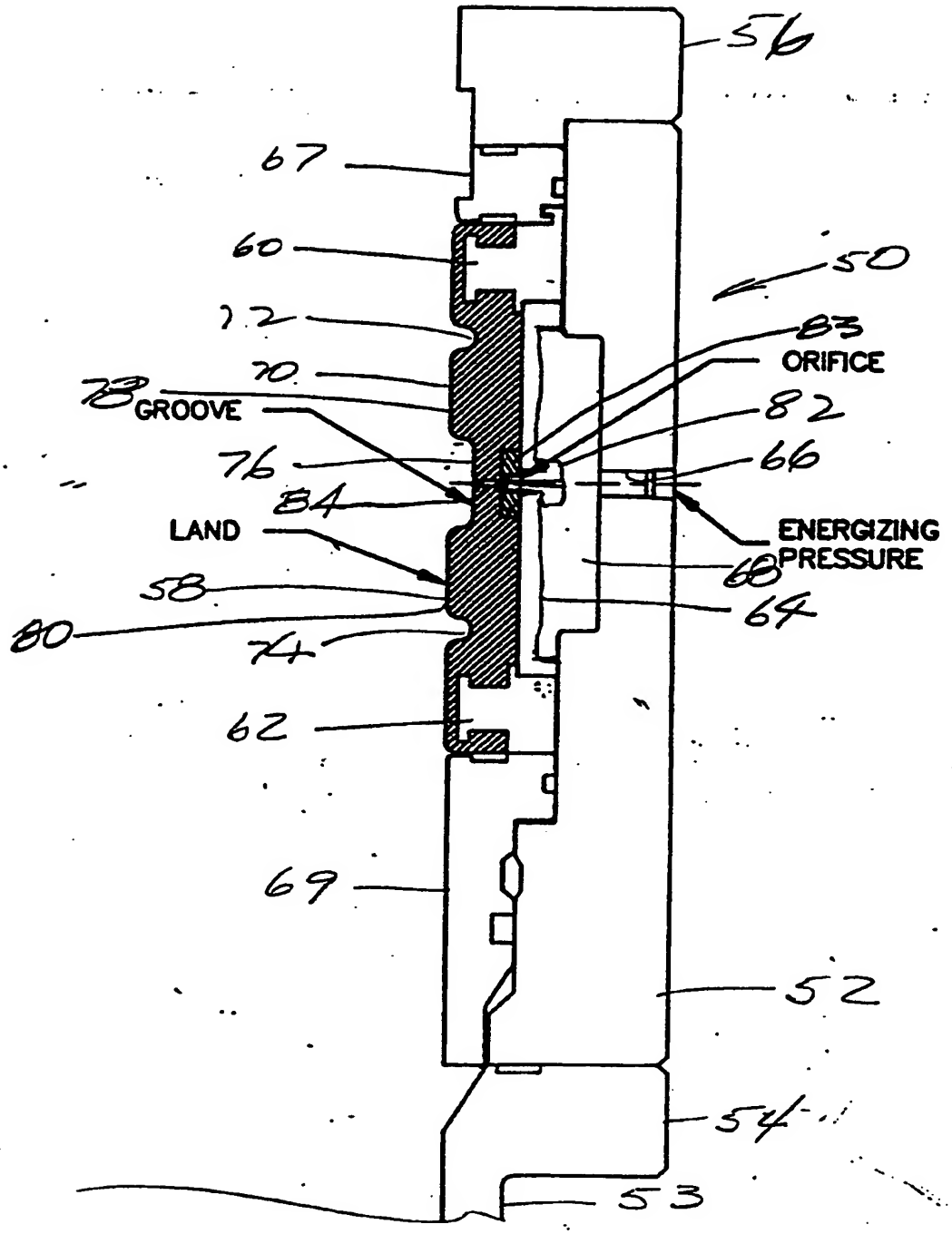


FIG. 2 PRIOR ART.



PRESSURE LOW WEAR TELESCOPING JOINT PACKER

FIG. 3

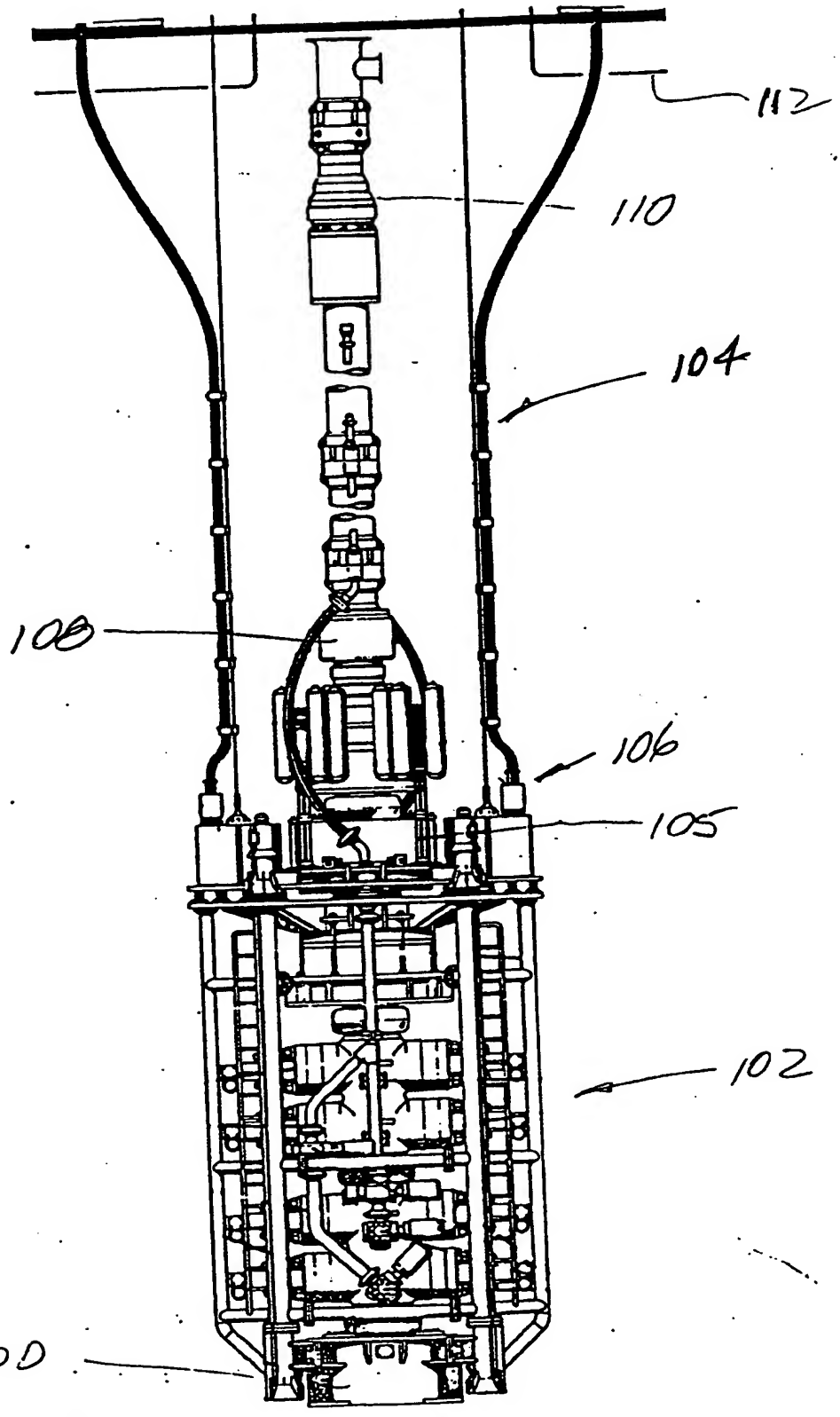


FIG.4

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 531 038 A3**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **92307758.0**

(22) Date of filing : **26.08.92**

(51) Int. Cl.[5] : **E21B 17/07**

(30) Priority : **03.09.91 US 754444**

(43) Date of publication of application :
10.03.93 Bulletin 93/10

(84) Designated Contracting States :
DE FR GB

(88) Date of deferred publication of search report :
23.06.93 Bulletin 93/25

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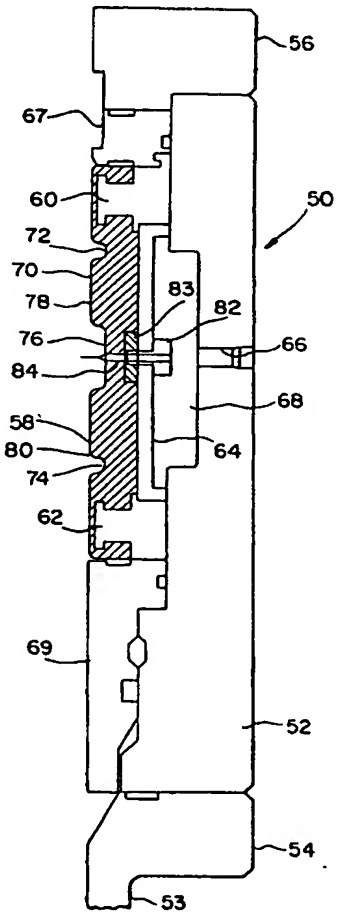

FIG. 3

EP 0 531 038 A3

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EUROPEAN SEARCH REPORT

Application Number
EP 92 30 7758

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	DE-A-2 841 819 (MANNESMANN AG) * page 4, line 10 - line 20; figure 2 *	1-7	E21B17/07 F16J15/16
Y	GB-A-2 218 162 (BLOHM + VOSS AG) * page 5, line 1 - line 11 * * page 6, line 5 - line 14; figure 2 *	1-7	
A	US-A-1 768 633 (H.C.RIES) * the whole document *	1,3-7	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E21B
F16J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 APRIL 1993	RAMPELMANN K.

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